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A NEW GENUS AND SPECIES OF INTERSTITIAL SIGALIONIDAE AND A REPORT ON THE PRESENCE OF VENOM GLANDS IN SOME SCALE-WORM FAMILIES (ANNELIDA: POLYCHAETA)

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Abstract.—*Metaxypsamma uebelackerae,* a new interstitial polychaete genus and species of the family Sigalionidae, is described from the northern Gulf of Mexico. *Metaxypsamma uebelackerae* differs from other known sigalionids in lacking notopodia and elytra, but these represent neotenic features coincident with an adaptation to an interstitial habitat. The similarities in the structure of the piercing-type jaws and associated venom glands of the Sigalionidae, Polynoidae, Polyodontidae, Pholoididae, and Pisionidae are discussed, and these are compared with two other scale-worm families, Eulepethidae and Aphroditidae, both of which lack piercing-type jaws and venom glands.

During 1975–1981, the U.S. Bureau of Land Management (now Minerals Management Service) funded several projects designed to characterize the fauna of the outer continental shelf along the northern Gulf of Mexico. In 1979, Barry A. Vittor & Associates, Inc., Mobile, Alabama, was funded by MMS to produce a taxonomic guide designed to standardize the identifications of polychaetes collected during these BLM projects (Uebelacker and Johnson 1984). *Metaxypsamma uebelackerae,* n. gen., n. sp., was discovered among the material examined during the preparation of a chapter to be included in this publication. At that time, *M. uebelackerae* was considered a potential new family (Wolf 1984). The species is described herein as a neotenic, interstitial member of the family Sigalionidae.

While examining *M. uebelackerae,* an internal canal was found in each jaw. This raised the question of why an internal canal was present except perhaps to channel a fluid in or out through the large fang. Larger sigalionids were then examined, and a large gland (colored white in preserved material) was found associated with each jaw. This is probably a venom gland. This has led to the inclusion here of a report of the presence of venom glands in families heretofore not known to have such glands.

Metaxypsamma, new genus

Family B, Genus A, Wolf 1984:60-1.

Type-species.—*Metaxypsamma uebelackerae,* new species.

Gender.—Feminine.

Diagnosis.—Body slender, with up to 24 segments. Prostomium with single median antenna arising frontally, lateral antennae lacking. Two pairs eyes present. Peristomium or tentacular segment achaetous, with tentaculophores directed anteriorly, each bearing dorsal and ventral tentacular cirrus. Pair of smooth digitiform palps emerging ventral to tentaculophores. Elytra lacking but low, fleshy mounds, each bearing 2–4 long, slender, knobbed papillae, present on segments 2, 4, 5, 7, continuing on alternate segments. Parapodia uniramous, with single internal aciculum. Setae as compound falcigers with short, serrate, unidentate blades. Proboscis eversible, muscular, with 2 pairs of chitinous, piercing-type jaws and distal papillae; venom glands present, adhering to ventrolateral plates of each jaw.

Etymology.—The generic name is derived from the Greek *metaxy,* between, and *psammos,* sand, referring to the interstitial habitat of the type-species.

Remarks.—*Metaxypsamma uebelackerae* at first appears to differ considerably from other members of Sigalionidae since it lacks notopodia and, instead of elytra, it has paired mounds of papillae. Cazaux (1968:531–534) describes the larval nectochaete I and II stages of *Pholoe synophthalmica* Claparède, 1868. He shows the nectochaete I stage as lacking notopodia and, instead of elytra, there are paired mounds of papillae. The nectochaete II develops notopodia but still retains the mounds of papillae, which are very similar to those of *Metaxypsamma.* It is apparent then, that *Metaxypsamma uebelackerae* is a neotenic sigalionid.

Among adult sigalionids, *Metaxypsamma* is most similar to *Pholoe* in lacking lateral antennae, in having an achaetous tentacular segment, in being of rather small size with few segments, in lacking branchiae, in having compound falcigers with short nonarticulate blades, and in lacking compound spinigers.

Metaxypsamma uebelackerae, new species
Fig. 1

Family B, Genus A, Wolf 1984:60-3, figs. 60-1, 60-2a–e.

Material examined.—FLORIDA: SOFLA Sta 5A, 26°45.70′N, 84°00.13′W, coarse sand, 91 m, Aug 1981, 3 paratypes, including 1 female (USNM 86845).—SOFLA Sta 5G, same location and date, 3 paratypes (USNM 86844).—MAFLA Sta 2426G, 28°57′59.4″N, 85°23′00.2″W, fine sand, 82 m, Feb 1978, 1 specimen, 1 slide (USNM 89582).—Sta 2748, 27°37.2′N, 83°53.5′W, coarse sand, 50 m, Jul 1978, Holotype, female (USNM 86846).—Sta 2958J, 25°40′N, 83°50′W, medium fine sand, 120 m, Feb 1977, 1 specimen.—Sta 2958I, same location, Aug 1977, 1 female.—Sta 2959H, 25°40′N, 83°05′W, silty-very fine sand, 60 m, Aug 1977, paratype, ripe male (USNM 97801).

Description.—Length to 2.5 mm, width to 0.5 mm, including parapodia, to 0.24 mm, excluding parapodia. Complete specimens with 21–24 segments. Segmentation distinct although intersegmental furrow present only on every other segment beginning at posterior margin of segment 9 and continuing to anterior margin of pygidium (Fig. 1a, c).

Prostomium bilobed with median antenna arising terminally between lobes (Fig. 1a); 2 pairs of eyes arranged trapezoidally; palps smooth, digitiform, emerging beneath prostomium; tentaculophores directed anteriorly, without setae or acicula, with dorsal and ventral tentacular cirrus, similar to median antenna in size and shape. Facial tubercle lacking.

Dorsum without elytra but with paired fleshy mounds bearing long, filiform papillae located above parapodia of segments 2, 4, 5, 7 and alternate segments thereafter (Fig. 1a, b). Anterior 5–6 mounds each with 2 papillae, following ones with 3–4 papillae.

Beginning on segment 2, ventrum with 2 pairs of globular papillae per segment on either side of midline just posterior to parapodia; beginning on segment 9, alternate segments with additional midventral papilla (Fig. 1c).

Ventral (buccal) cirri of segment 2 twice as long as following ventral cirri. Parapodia uniramous, highly contractile, each supported by single, pointed aciculum; parapodial stylodes and papillae lacking (Fig. 1a, b). Setae compound, unidentate falcigers only, about 6–7 per parapodium, 2 above aciculum in single row, 4–5 below aciculum in 2 rows. Falciger blades with minute teeth along concave margin; blades of anterior segments somewhat longer than those of following segments and with shorter marginal teeth (Fig. 1d, e).

Pygidium with 2 pairs of filiform anal cir-

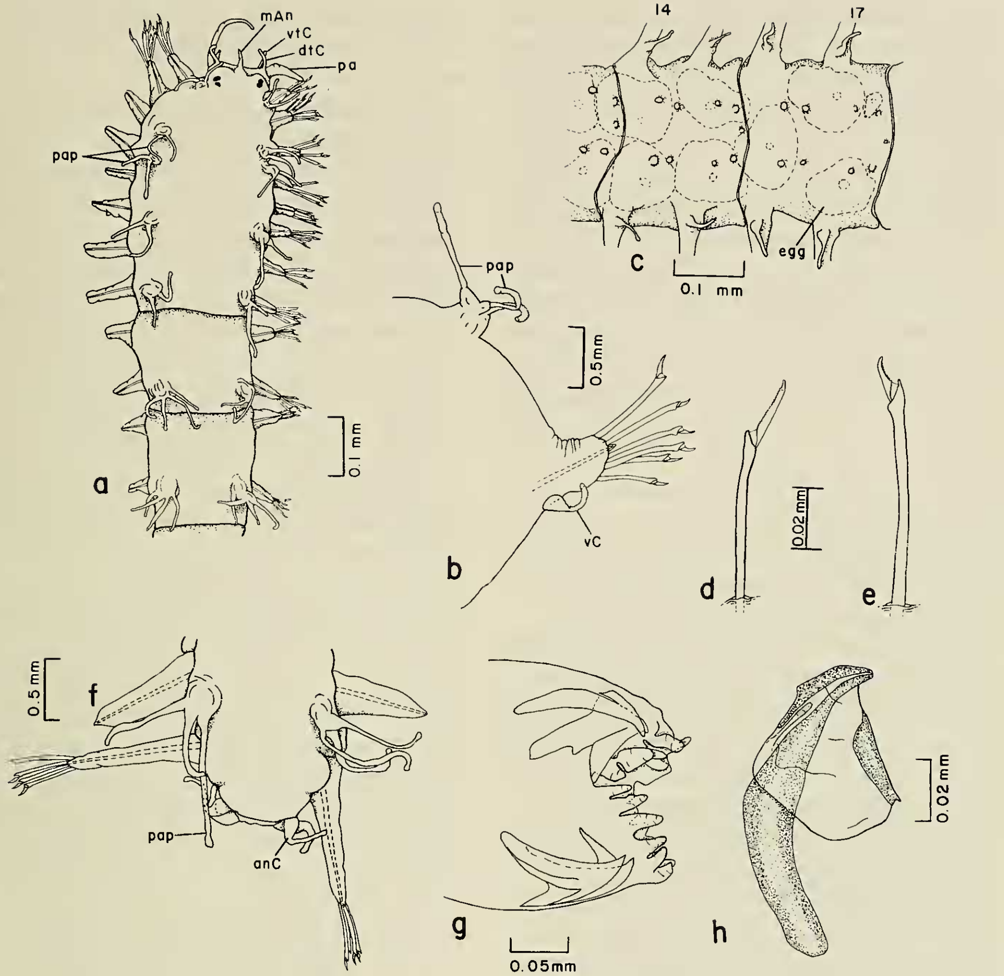

Fig. 1. *Metaxypsamma uebelackerae*: a, Anterior end, dorsal view; b, Parapodium from segment 9, posterior view; c, Segments 14–17, ventral view; d, Neuroseta from segment 2; e, Neuroseta from segment 9; f, Posterior end, dorsal view; g, Distal end of dissected proboscis, lateral view; h, Dorsal left jaw, inside lateral view. anC, anal cirrus; dtC, dorsal tentacular cirrus; mAn, median antenna; pa, palp; pap, papilla; vC, ventral tentacular cirrus (Figs. a, b, d–f from Wolf, 1984:Figure 60-2a–e).

ri located lateral to terminal anus; cirri about half as long as dorsal papillae (Fig. 1f).

Proboscis eversible, muscular, with 2 pairs of chitinous, piercing-type jaws and distal circle of 9 pairs of papillae (Fig. 1g). Each jaw with a broad plate located ventrolateral to long stem, with internal canal extending to tip of large tooth (Fig. 1h). Venom gland not observed.

Remarks.—Three mature females, including the holotype, were collected. The diameter of the largest egg was about 128 μm. About 30 eggs were present in the holotype from segment 9 to the pygidium (Fig. 1c). One ripe male contained large amounts of sperm from setiger 10 to the end of the body.

A peculiar phenomenon was noted for *M. uebelackerae,* namely the presence of intersegmental furrows on alternate segments beginning on the posterior margin of segment 9 (Fig. 1a, c). Coincident with this alternate arrangement of the furrows is the arrangement of the midventral papilla and the paired mounds of papillae dorsally. I then examined several undescribed species of *Pholoe* and found the intersegmental furrows on alternate segments, also, except that beginning on segment 23 the furrows are found on every segment. Segment 23 is also where elytra appear on every segment. I also examined larger sigalionids (*Sthenelais* sp. and *Psammolyce ctenidophora*) and found the intersegmental furrows on every segment even in the region where elytra are present on alternate segments. This arrangement was also observed in *Pholoides bermudensis* (Pholoididae), two species of *Pisione* (Pisionidae), and several species of Polynoidae and Polyodontidae. In *Pholoides bermudensis,* however, the furrows are faint along the entire body.

The significance of the segmental arrangement of the furrows is not possible to assess here, since histological sectioning would be necessary to determine whether or not what appears externally to be reduced segmentation is actually the case internally. Such resources were not available to the author.

The morphological adaptations of *M. uebelackerae* afford an interesting comparison with *Pholoe swedmarki* Laubier (1975: 671–678), an interstitial sigalionid from Bermuda. *Pholoe swedmarki* has notopodia, but they are reduced with few notosetae, whereas *M. uebelackerae* has lost its notopodia completely. *Pholoe swedmarki* has retained its elytra; *M. uebelackerae* has replaced them with paired mounds each bearing long, flexible papillae. Both species have somewhat reduced tentacular cirri. In *P. swedmarki* the dorsal tentacular cirri are longer than the median antenna and the ventral cirri are much smaller and of a different shape than the dorsal ones. In *M. uebelackerae,* the dorsal and ventral tentacular cirri are similar to each other and to the median antenna in size and shape. *Pholoe swedmarki* has up to 27 segments; *M. uebelackerae* has up to 24. *Pholoe swedmarki* measures up to 1.6 mm by 0.4 mm while *M. uebelackerae* measures up to 2.5 mm by 0.5 mm.

Both species are considered to be interstitial worms, but the neotenic *M. uebelackerae* exhibits the more derived conditions, i.e., the loss of elytra, loss of notopodia, and reduction in the number of segments, even though it is a slightly larger species. It is body width, however, that determines the minimum diameter of the interstitial space an animal may inhabit (Westheide 1984:265). It is suggested here that *M. uebelackerae* has, through the loss of elytra, gained a functionally narrower body width than *P. swedmarki.* This could enable the former to invade smaller interstitial spaces than the latter.

Etymology.—The species is named in honor of Ms. Joan Uebelacker who, as senior editor of "Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico" (Uebelacker and Johnson 1984), edited every chapter and, therefore, is largely responsible for the success of those volumes. Her editorial and scientific efforts are gratefully acknowledged and deeply appreciated.

Distribution.—Gulf of Mexico, off Florida, 50–120 meters.

Observations on Scale-worm Jaws and Venom Glands

The jaws of three other sigalionids, *Sthenelais* sp., *Psammolyce ctenidophora, Pholoe* sp., and *Ehlersileanira incisa* were also examined. In all these specimens, the basic structure and appearance of the jaws were the same including the presence of an internal canal and a large, white, spongy, glandular mass of tissue adhering to the dorsal side of the large, ventrolateral plate of each jaw. This glandular mass leads into the internal canal within the fang of the jaw. This white mass is here interpreted to be a venom gland. A venom gland could not be found in *Metaxypsamma uebelackerae,* perhaps because of its minute size, but its presence is suggested by what appears to be a small duct and a volume of cellular material within the internal canal of each jaw.

The jaws of other scale-worm families were also examined: Polyodontidae (*Polyodontes lupinus* and *Eupanthalis tubifex*), Polynoidae (*Lepidasthenia* sp.), Pholoididae (*Pholoides bermudensis*), Eulepethidae (*Grubeulepis* sp.), and Aphroditidae (*Aphrodita* sp.). The polynoid and pholoidid jaws are very similar in shape to that of the sigalionids and have venom glands associated with their jaws.

The polyodontid jaw differs in that its ventrolateral plate is fused to the concave margin of the main fang, and this plate is dentate along its outer edge. These jaws have a venom gland adhering to the dorsal side of the plate, but it appears smaller and less developed relative to the large size of the animal and its jaws, as compared to the large gland found in the Sigalionidae, Polynoidae, and Pholoididae.

The Eulepethidae and Aphroditidae do not possess piercing-type jaws. Their jaws consist of broad, chitinous plates which do not have any associated venom glands.

The jaws of the Pisionidae (*Pisione* sp.) were also examined and found to be remarkably similar to the sigalionid jaw. A venom gland, located as in the sigalionids, leads into an internal canal that extends to the tip of the fang.

If the above described glands do indeed produce venom, the question remains as to how the venom is released. Glycerids, according to Gibbs and Bryan (1980:205), release venom through a series of lateral pores located on the main fang of the jaw. No such pores were found associated with the jaws of the scale-worms examined. The internal canal does extend to the very tip of the main fang, but there did not appear to be an open pore at the tip.

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Literature Cited

Cazaux, C. 1968. Étude morphologique du développement larvaire d'Annélides polychètes. (Bassin d'Arcachon).—Archives de Zoologie Expérimentale et Générale 109(3):477–543.

Claparède, E. 1868. Les Annélides Chétopods du Golfe de Naples.—Mémoires de la Société de Physique et d'Histoire Naturelle de Genève 19(2):313–584.

Gibbs, P. E., and G. W. Bryan. 1980. Copper—the major metal component of glycerid polychaete jaws.—Journal of the Marine Biological Association of the United Kingdom 60:205–214.

Laubier, L. 1975. Adaptations morphologiques et biologiques chez un aphroditien interstitiel: *Pholoe swedmarki* sp. n.—Cahiers de Biologie Marine 16:671–683.

Uebelacker, J. M., and P. G. Johnson [Eds.]. 1984. Taxonomic guide to the polychaetes of the northern Gulf of Mexico. Final Report to the Minerals Management Service, contract 14-12-001-29091. Barry A. Vittor & Associates, Inc., Mobile, Alabama. 7 vols.

Westheide, W. 1984. The concept of reproduction in polychaetes with small body size: adaptations in interstitial species.—Fortschritte der Zoologie 29:265–287.

Wolf, P. S. 1984. Family B. *In* Uebelacker and Johnson, 1984 (see above). Taxonomic guide to the polychaetes of the northern Gulf of Mexico. Barry A. Vittor & Associates, Inc., Volume VII. Chapter 60. 3 pp.

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